Pyramid-like Gold Electrodeposit Formation in the Stranski-Krastanov Mode

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The Stranski-Krastanov (S-K) mode transition in gold electrodeposition using a sodium disulfiteaurate (I) solution was investigated. After a smooth gold thin film was grown on an Indium Tin Oxide (ITO) glass, a pyramid-like gold electrodeposit emerged on the smooth gold thin film. The pyramid-like gold electrodeposit showed a truncated pyramid-like configuration comprising four (111) planes. A critical film thickness at which the pyramid-like gold electrodeposit appears was found to be dependent on temperature. Texture coefficients of the gold thin film determined by x-ray diffraction (XRD) reveal that the S-K mode transition takes place when the (110) plane becomes dominant among the other crystallographic planes such as the (111), the (100), and the (311) plane. A scanning electron microscope (SEM) image shows that the pyramid-like gold electrodeposit formed at the critical film thickness may become a candidate for quantum dots.

Keywords: Stranski-Krastanov mode, pyramid-like gold electrodeposit, critical film thickness, texture coefficient, sodium disulfiteaurate (I)

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